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ABSTRACT
                The British Open University delivers distance
education to over 200,000 students per year. The University has been
a multimedia institution since its inception and in addition to
printed materials, currently ships to students in a single year: over
34,000 special equipment kits, around one million audiocassettes,
over 100,000 videocassettes, and over 350,000 computer disks. The
University has been looking at ways of creating integrated multimedia
learning environments for students for a number of years. It was
decided to find an existing course which lends itself to an
integrated multimedia approach and establish a multimedia
presentation that enhances the students' learning experience. The
"Homer Project," consists of Homer's "Iliad" and "Odyssey" and
commentary text for each; 15 essays from "Homer: Readings and
Images"; two 120-minute videocassettes; four 90-minute and one
60-minute audiocassettes; and five printed guides which relate to and
integrate the preceding items. The learning environment allows the
student to progress along a prescribed study route on a weekly basis.
Materials are integrated into the studies and are independently
accessible by the students: Poems (the complete texts of the "Iliad"
and the "Odyssey"); Library (a number of essays and companion texts
to the poems); Sites (site plans and audiovisual material associated
with Troy and Mycenae); Skills (activities to improve archaeological
and literary skills); Museum (photographs of relevant artifacts held
in museums and audiovisual material linking them to Troy and
Mycenae); and A-Z (a chronological table relevant to the period
covered on the poems). Developmental testing of this learning
environment in order to determine educational effectiveness is
currently taking place before the course is offered for credit.
(MAS)

Integrated Multimedia in Distance Education

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Abstract

The British Open University is a world leader in distance education and a range of media has been used successfully in its teaching programme. The University has been looking at ways of creating integrated multimedia learning environments for students for a number of years. The growth of the University's Home Computing Programme and advances in multimedia technology will make these types of environments a reality for Open University students before the end of the decade. A number of projects have already addressed the technical issues and several new projects have been undertaken to look at the potential of multimedia in distance education. One particular development planned for completion in 1994 will result in a multimedia learning environment built around Homer's epic poems and their archaeological contexts.

Introduction

The Open University delivers distance education to over 200,000 students each year. At the heart of most courses is a set of specially-written textbooks or workbooks. Additional material may also include special equipment lent to the student for practical work, audio and videocassettes and computer software. Many courses include radio and television programmes on the national BBC networks. The University offers students a regionally based teaching and counselling support system through its thirteen regional centres. Some courses include one-week residential schools which are usually held in the summer months at other universities or conference centres in the United Kingdom. There are also shorter residential schools, part-week and weekend for other courses.

The University has been a multimedia institution since its inception and in addition to vast amounts of printed materials, currently ships to students in a single year: over 34,000 special equipment kits, around one million audiocassettes, over 100,000 videocassettes and over 350,000 computer disks. As in most other higher education institutions, there has been a rapid growth in the use of the personal computer as a teaching media in Open University courses. A Home Computing Programme was launched in 1988 which required students taking certain courses, to provide their own access to PC compatible machines meeting a minimum specification. This programme now includes 18 courses and supports over 20,000 students. While the current minimum specification does not fully support new multimedia technologies, it is being upgraded for all new courses from 1995. This new minimum specification will support these technologies and will also include a communications facility. It is important to note that the issue of student access to computing equipment is a fundamental problem associated with the introduction of computer-based teaching to distance education courses.

The University's Residential School Programme currently offers computing activities to over 40,000 students and in 1994, over 900 computers will be installed for student use. These schools allow the

University to set up computer laboratories more common to traditional universities. They are often used as a test-bed for new technologies and activities based on interactive videodisc systems and CD-ROM have been available to students for a number of years.

Non-Integrated Multimedia in Distance Education

Every Open University course is produced by a multi-disciplinary team and depending on the choice of teaching media, normally includes Academics, Software Designers, Graphics Designers, Editors, BBC Producers and Educational Technologists. All course material is considered by the team and a number of drafts of printed material, versions of software and scripts for audio and video material are produced.

While it is true to say that the Open University is a multimedia institution, the integration of different media types on most courses takes place through print-based material. Students are provided with printed course guides and a study calender which recommends a weekly schedule. In a course which provides a wide range of media, the logistics of home-based study have to be taken into account in developing these course guides. Many students have spouses and children and are unlikely to have a study area equipped with a computer, video and audio equipment. So their use of the different media has to be planned around their family's activities and in many cases, the real integration of the media takes place in the student's head.

Early attempts to overcome these difficulties involved the use of audiocassettes to assist the student's study of particular printed material. This idea was extended to computer-based activities in 1988 when a course in computational mathematics developed a number of teaching packages. Each package was intended to reinforce specific teaching points and was accompanied by an audiocassette, whose commentary was scripted to match the software. The packages were produced jointly by Academics in the Faculty of Mathematics and Computing, BBC Producers and Software Designers from the University's Educational Software Group.

The Integration Process

While the University continues to develop computer-based activities for use at residential schools which exploit multimedia technologies, new projects are underway to develop integrated learning environments and establish their effectiveness, particularly in home-based study.

Project Choice

As in most higher education institutions, the Open University is committed to a specific programme of course development in a climate of fierce competition. A proposal to produce a course based on new multimedia teaching material would not be favourably received at this time, given the student access issue and the uncertainty over the quality of a course of this kind. It is more appropriate to find an existing course which lends itself to an integrated multimedia approach and establish that a multimedia presentation enhances the student's learning experience.

The course A295 *Homer: Poetry and Society* which was first presented in 1993 was chosen because from the outset, it was conceived as a highly integrated course in which video, audio and print would work together in a complimentary way. This format lends itself to a technology that permits immediate access to any of these media at a single source. The course contains a number of areas that are difficult to teach using non-integrated media, for example; showing students how to use and learn from archaeological site plans or searching the texts of the poems in a structured way.

The Project

The 'Homer Project' is based on some of the material from the course A295 *Homer: Poetry and Society*. The course as a whole consists of the following components:

Set Books:	Homer's *Iliad* and *Odyssey* and a commentary text for each.
Essays:	15 essays from *Homer: Readings and Images*
Video:	2 x 120 minute videocassettes
Audio:	4 x 90 minute and 1 x 60 minute audiocassettes
Learning Guides:	5 printed guides which contain all the pedagogical apparatus relating to and integrating the above items.

The project involves converting the material associated with Learning Guide Two into a multimedia presentation. This material consists of about 750,000 words of text, 96 minutes of audio and 100 minutes of video.

The aim of the project is to test and report on the success of multimedia as a humanities distance-teaching medium; to identify practically its limitations both in terms of its production and presentation; and to assess the ways the medium works with traditional media. The project will provide basic information for the University as it plans for the introduction of multimedia technologies into its next generation of courses.

The Production Team

The 'Homer Project' has brought together a multi-disciplinary development team which is based around members of the original course team. The two BBC Producers and BBC Graphics Designer produced the audio visual material in the course and the Academic Consultant was a key academic member of the course team. The project is being managed by the University's Educational Software Manager and a Senior Software Designer and Software Designer are responsible for software design and implementation. The original course Editor has been seconded to the project for a year and is contributing both academically and editorially. An Educational Technologist from the University's Institute of Educational Technology is making a major contribution to the pedagogical design of the material and is responsible for developmental testing and evaluation.

The team operates in a similar fashion to a traditional Open University course team, with all members contributing to and commenting on all aspects of the project. A major difference however is that the Producers and Graphics Designer are playing a much more central role in the design process than they normally would in a non-integrated multimedia course.

The Teaching Strategy

The basic principle argued for in the project and taught in the existing course, is that the *Iliad* cannot be fully understood and appreciated without considering the relationship between the poem and its possible material contexts provided by examination of archaeological sites, by looking at landscape, topographical details and so on.

The project team decided to develop two strands, one based on the archaeology and the other based on the literature. These strands are interwoven throughout a central spine or study route through the course material. The BBC Producers, in consultation with the Academic Consultant were responsible for developing all of the archaeological based teaching material, while the Editor and academic consultant concentrated on the literary based material.

The study route consists of six weeks of study and each week has a number of investigations to be undertaken by the students. Each weeks' study concludes with a recapitulation of the main teaching

points and a target milestone in the student's understanding of the material. Each investigation draws on a range of multimedia materials which are described below. The study route is intended to encourage a guided discovery form of study rather than one based on dialogue, which is the more traditional computer assisted learning approach. It is hoped that this induces in students a sense of being in control of the learning process, rather than waiting to be told what to do next.

Producing the Integrated Learning Environment

A learning environment has been designed which allows the student to progress along a prescribed study route on a weekly basis. While all of the multimedia teaching materials are integrated into the study route, they can also be accessed by the student independently, with their own user interface. These materials are categorized as follows:

Poems:	The complete text of the *Iliad* and the *Odyssey*
Library:	A number of essays and companion texts to the *Iliad* and the *Odyssey*
Sites:	A number of site plans and audio visual material associated with Troy and Mycenae
Skills:	Activities to improve archaeological and literary skills
Museum:	A number of photographs of relevant artifacts held in museums and audio visual material linking them to Troy and Mycenae
A-Z:	A chronological table relevant to the period covered in the poems

All text material can be accessed with full text retrieval tools and students have access to a notebook facility. This allows them to make notes and link these to specific quotes from the text material. Within the investigations there are textual discussions with hyperlinks to the poems.

Extensive use has been made of stills with audio commentaries and this has significantly reduced the amount of video necessary to make specific teaching points. The concept of a "vision bite", where use is made of very short video sequences is not compatible with a non-integrated multimedia presentation, but quite possible when the media becomes fully integrated.

Following the University's student computing model, the learning environment runs under Microsoft Windows. While most educational software developed for Open University students uses software tools developed in-house and written in C++, these tools do not yet offer full multimedia support. Given the time scales imposed on the project, it was decided to use commercial tools and development work was carried out using Asymetrix TOOLBOOK and Microsoft Multimedia Viewer 2.0.

The delivery platform is a high specification PC compatible with 16-bit multimedia audio card, Intel ActionMedia II delivery board and dual speed CD-ROM drives. Video files are stored in Intel's Indeo Video format and although the software will run without the ActionMedia delivery boards installed, they are desirable to achieve the highest possible video quality.

Copyright

All of the material currently used by students in the course has been cleared for copyright in its present form. Putting the same material into a different format has meant that all of the copyright clearances have had to be renegotiated. While in many cases this has just had a cash cost associated with it, some holders of copyright have refused to grant clearance. The University is fortunate to have a Rights Department to deal with this problem, but it is an issue which will continue to be fundamental to the development of multimedia educational materials.

Developmental Testing

As each component of the learning environment is completed, individuals interested in the material have been used to test it. This testing takes place with the Educational Technologist in attendance and feedback is provided to the software developers or to the project team, if fundamental design questions are raised.

The completed multimedia material is being distributed to about 20 students who have already taken the course. They are being selected to cover a range of study success and being asked to restudy the material in Learning Guide Two, using the multimedia materials. The course team do not wish to see the multimedia parts of the course developmentally tested for credit at the outset. If the initial developmental testing indicates that students will not be disadvantaged, then a developmental testing programme for credit may be built around the multimedia elements of the entire course.

The University's Institute of Educational Technology will be carrying out a project evaluation after students complete the study period. The Educational Technologists acknowledge that it is not clear how one assesses the relative educational effectiveness of a non-integrated and integrated multimedia presentation of the same material. They hope that through this project, guidelines may emerge for future courses.

Conclusions

The Open University has recognised the difficulties that a number of its course teams face in presenting their courses through non-integrated multimedia learning environments. Projects such as the one described in this paper are intended to establish that integrated multimedia learning environments will considerably enhance the learning experience of students in distance education. Some 20,000 students are currently studying courses which require them to have access to a personal computer. From 1996, a considerable number of students will have computers which support multimedia applications and they will quite reasonably expect the University to provide them with integrated multimedia teaching materials.

The integration of multimedia learning environments into a specific course is labour intensive and while this paper is being written before the report on the 'Homer Project' is complete, it is already clear that such developments are going to be very expensive in the short term. We can only hope that once these developments become a normal part of the University's course production process, integrated multimedia will offer benefits to the institution as well as its students.

Acknowledgements